Chapter 23

SPACE OPERATIONS AND TACTICAL APPLICATION - U.S. ARMY

Many of the U.S. Army's recent actions dealing with space have been dedicated to the institutionalization of space throughout the Army; incorporation of space capabilities into all exercises, activities and units; and early involvement of space support in tactical operations through deployable Army Space Support Teams (ARSSTs).

BACKGROUND

Mainstream Army development of space capabilities has been based on the premise that value added from space-based systems should be transparent to the user and should support the need for increased information accuracy and the improved mobility of future forces. In times of peace, the same space-based systems and capabilities enhance the effectiveness and efficiency of training as well as operations other than war.

Integration of space systems and capabilities into Army operations offers a substantial increase in the Army's ability to satisfy force projection missions. As the application of space-based systems and capabilities are focused to satisfy longer term Army requirements, the success of strategic, operational and tactical operations will become increasingly linked to the control and use of space. Examples of activities supported by the control and use of space include:

- Maintaining peace through monitoring arms control agreements;
- Providing global indications and warning of potentially dangerous situations and hostile actions;
- Maintaining global situational awareness of evolving political, economic, diplomatic and military events that could trigger a crisis or erupt into war;
- Maintaining a strategic deterrent posture by providing missile attack warning, information on nuclear events and survivable communications to permit nuclear force command and control;
- Maintaining knowledge of the enemy and the battlefield environment through space-based information and communications;
- Maintaining an effective missile defense capable of identifying, acquiring, tracking and destroying missiles launched against our forward deployed forces;
- Gathering detailed threat and target information, weather and environmental information, precise determination of friendly and enemy positions and assessment of battle damage.

The success of future Army missions will be enhanced by further development and optimal integration of space operations into land operations. This includes the application of existing and emerging technological capabilities provided by space-based systems and crossover technology from research and development in other areas. To meet future needs, the Army will continue to actively participate with other services and national agencies in planning, programming, developing, operating, managing, tasking and controlling space activities specifically supporting land operations.

Army requirements not met by national programs and programs assigned to other services or agencies will be satisfied by capabilities developed and fielded by the Army.

FUTURE CONFLICT

Experiences in operations DESERT STORM, RESTORE HOPE and UPHOLD DEMOCRACY provide a vision of a new style of war employing space across a wide range of Army operations (**Fig. 23-1**). This new style of war is characterized by the increased density of hi-tech equipment, joint operations, multi-dimensional maneuver, lethality brought on by long range precision munitions and an increased situational awareness through sophisticated intelligence, location and communications systems. The pace, complexity and decisiveness of modern war dictates that future military operations will be inherently joint. Allied or coalition forces and national, international and civil agencies/organizations will remain elements of the total force.

SPACE SUPPORT TO ARMY OPERATIONS

A force-projection Army is required to be capable of rapidly deploying a highly lethal and survivable entry force anywhere in the world. The phases of force-projection operations may overlap in space and time and are not distinct, requiring commanders to plan and execute multiple activities either simultaneously and/or sequentially. Generally, there is uncertainty and friction associated with force-projection operations, making success a complicated matter. Space offers a wide range of capabilities that when properly employed will reduce uncertainty. Deploying forces will depend on communications, positioning/ navigation, reconnaissance, surveillance, missile warning, weather and environmental support solely from space-based systems throughout all phases of force-projection operations, whether in war or operations other than war.

TRAINING AND DOCTRINE COMMAND (TRADOC)

The Army's Training and Doctrine Command headquartered at Ft. Monroe, Virginia, and its subordinate U.S. Army Intelligence Center located at Ft. Huachuca, Arizona, are responsible for establishing all space-based related intelligence requirements which drive the Army Tactical Exploitation of National Capabilities (TENCAP) program. In addition, TRADOC is responsible for capturing and integrating the various TENCAP systems, organizations and architectures into the Army force structure.

Fig. 23-1. During DESERT STORM, space-based assets supported TMD

As the training proponent for the Army, TRADOC conducts resident instruction on TENCAP and TENCAP systems at Ft. Huachuca and provides non-resident instruction throughout the Army force structure, both at the unit level and in other formal course settings.

As the Army's doctrinal proponent, TRADOC is responsible for capturing the Army's TENCAP program and its systems into the architecture, force structure and doctrine of the Army.

TRADOC accomplishes these missions by working closely within the Army through key organizations such as the Army Space Command (Forward) (ARSPACE (FWD)), the Army Space and Missile Defense Command (SMDC), the Army Space Program Office (ASPO) and the various Battle Labs located throughout the Army. Moreover, TRADOC personnel work closely with the other services and various DoD and National agencies.

ARMY SPACE COMMAND (FORWARD)

Fig. 23-2 Emblem

Army Space Command (ARSPACE) **(Fig. 23-2)** is the element of Army Space and Missile Defense Command responsible for providing space support to the warfighter. ARSPACE (FWD) maintains specific responsibility for functions as addressed in the following paragraphs.

Missile Warning and Alert Notification

The Joint Tactical Ground Station or JTAGS, is the transportable in-theater element of the US Space Command's Theater Event System and provides Theater Commanders with a continuous 24-hour capability to receive and process in-theater, direct down-linked data from space-based sensors. JTAGS (**Fig. 23-3**) ties directly to worldwide and theater communications systems to immediately disseminate critical information. JTAGS supports all Theater Missile Defense (TMD) pillars and provides worldwide warning and alerting as well as in-theater voice warning and cueing information on tactical ballistic missiles (TBM) and other tactical events of interest.

The JTAGS processes data from up to three DSP satellites to determine launch points and time, azimuth of flight, predicted ground impact point and time for TBMs. JTAGS supports passive defense by providing in-theater early warning of enemy ballistic missile launch events, and provides alert notification to command level staffs, who disseminate the alert message to units in the threatened area. JTAGS also supports active defense by cueing air defense assets to the missile track. Data is also provided on launch location to deep attack assets to aid in attack operations.

Fig. 23-3. JTAGS Deployed

The key to JTAGS theater support is its relatively direct connectivity and distribution architecture, via a variety of voice and data networks. By its in-theater location, JTAGS provides timely, assured early warning. ARSPACE operates two JTAGS sections indefinitely forward deployed by CINCSPACE to Korea and Germany, and maintains deployable sections in CONUS for contingencies.

Communications Support

The Defense Satellite Communications System (DSCS) provides reliable, robust, worldwide, continuous communications support to US warfighting forces, strategic military users, the US intelligence community and the National Command Authority. Customers can communicate via the DSCS using large, fixed earth ter-

minal ground stations, transportable ground stations, and highly mobile, tactical ground stations. ARSPACE's 1st SATCOM Battalion is responsible for the daily C2 of the DSCS satellite and communications networks supported by these satellites. The battalion operates DSCS Operations Centers (OC) at five SATCOM locations around the world to oversee all use of the DSCS, ensuring that users receive the optimal SATCOM support authorized. On a typical day, the DSCS OCs control nearly 1000 links providing vital communications support to deployed warfighters, strategic users, and the intelligence community around the world.

Regional SATCOM Support Centers (RSSC)

RSSCs currently provide the joint warfighter a single focal point for select satellite communications use within a region. RSSCs coordinate and ensure that ground mobile forces obtain necessary access to DSCS SHF-band, MILSTAR EHF, and commercial satellite resources. Additionally, they provide tactical communications satellite network planning and management support for CINCs and DOD agencies. The RSSCs are located at Wheeler Army Airfield, Hawaii; Patch Barracks, Germany; Arlington, Virginia; and Tampa, Florida for focused support to CINCs. In the future, the RSSCs will be the CINCs' and DOD agencies' one-stop-shop for all SATCOM – EHF, SHF, UHF, GBS and commercial.

Execution of the Army Space Exploitation Demonstration Program (ASEDP)

The ASEDP program has been operating in one form or another since 1988. Originally created under TRADOC at the Army Space Institute, the then Army Space Demonstration Program (ASDP) was moved to Army Space Command and became the Army Space Exploitation Demonstration Program (ASEDP). The operating concept of the demo program was to select easily demonstrated functions where space could contribute readily to Army operations.

The original ASEDP functions were Weather, Multispectral Imagery (MSI), Position Navigation/Global Positioning System and Communications. These functions were laid out in a mid-1980's study entitled the "Army Space Initiatives Study" (ASIS), which introduced the Army Space Concept and a detailed strategy for facilitating Army use of space supporting tactical operations.

Each of the early entries to the Space Demo Program have now been fielded to Army tactical units:

- The Position Navigation/GPS Demonstration became known as the Small Lightweight GPS Receiver (SLGR) (**Fig. 23-4**) and was used extensively by U.S. Forces to track their positions in the desert during operation DESERT STORM.

Fig. 23-4. SLGR

- The Weather Demonstration was originally fielded as the Wraase weather receiver.

- The MSI demonstration was first fielded to the 30th Engineer Battalion during DESERT STORM and more recently, throughout the Army as the MSI Processor (MSIP).

- Communications projects under the ASEDP took the form of UHF experiments (**Fig. 23-5**) using lightweight off-the-shelf components and experimental or commercial satellites.

Fig. 23-5. Army UHF Experiment

Since inception, the ASEDP has undergone changes caused in part by its transfer of responsibility from USARSPACE to the SMDC Battle Lab (SMDBL).

These changes are intended to provide more quality proposals, rapid prototyping, and a rejuvenated process. However, the ASEDP foundation, to identify and evaluate state-of-the-art space related technologies to increase combat effectiveness, has not changed.

The new process (**Fig. 23-6**) establishes focus and specific selection criteria for each ASEDP demonstration family. Current warfighter needs are compared to technologies that meet those needs or may potentially assist the warfighter. Requirements are identified from Future Operational Capabilities, Mission Needs Statements, Operational Requirements Documents, and warfighter feedback. The CG, SMDC enters the process earlier, approving the focus and selection criteria. By changing the contracting approach, prototypes may be obtained and demonstrated quickly. The selection process is not bound by fiscal year constraints.

Several times a year, Army-wide subject matter experts receive and evaluate ASEDP proposals, focusing on the functional areas outlined in FM 100-18, Space Support to Army Operations. The general areas for proposals are organized into Demonstration Families: (1) Battlefield Command, Control, and Visualization, (2) Communications, (3) Reconnaissance, Intelligence, Surveillance, and Target Acquisition (RISTA), (4) Weather, Terrain and Environmental Monitoring, (5) Warning, and (6) Position/Navigation.

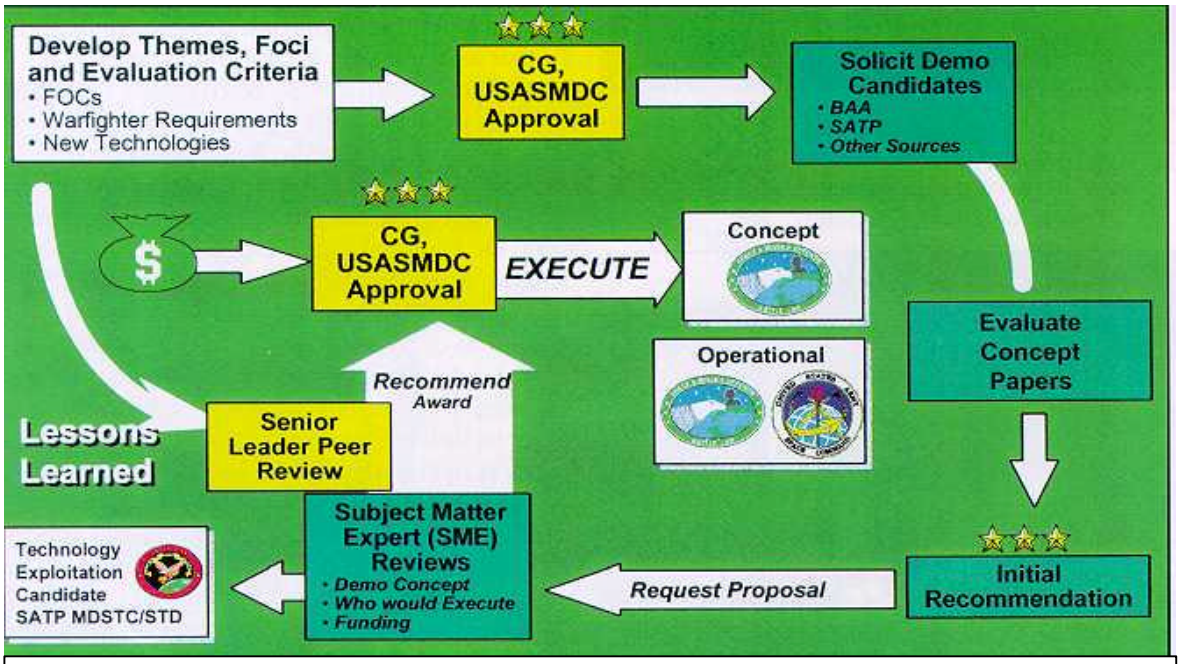

Fig. 23-6. ASEDP Process

Each of the Demonstration Families in the ASEDP Program includes two types of demonstrations, Concept and Operational. Each type is focused on a particular level of developed technology and on different organizational levels of the Army. As the overall ASEDP organizational lead, the SMDBL integrates both demonstration types into a coherent program.

Concept (C) demonstrations generally involve items that are rugged enough to be taken to various Army locations to be demonstrated in a controlled environment. Typical audiences are TRADOC organizations with an interest in the area, which the capability addresses. The SMDBL leads these demonstrations and arranges for their execution within TRADOC and other Army organizations.

Operational (O) demonstrations primarily involve prototypes that have matured from technologies already evaluated. These demonstrations are sufficiently advanced and rugged for use by soldiers during field exercises. Typically, a battalion, brigade, or division will incorporate the devices or capabilities into training exercises or an Army Warfighting Experiment. Habitual relationships have been established between the SMDBL and Forces Command units to conduct Battle Lab experiments and, as appropriate, ASEDP demonstrations. If a demonstrated capability is useful, appropriate transition partners work to ensure development and fielding of that capability within the Army. Operational demonstrations are normally executed by SMDBL or USARSPACE, although occasionally other organizations will assist or conduct the demonstration.

Demonstration families include the following, characterized as either Concept (C) or Operational (O):

Battlefield C2 and Visualization

- Space Enhancements to C2 (C)

Intended to enhance Army battle C2 functions through the use of space-based systems and products. Force warning of events such as ballistic missiles, chemical, biological, and minefields will be broadcast by pagers using low data rate communications. Blue force tracking will be integrated into the C2 system using GPS and Grenadier Brat. Connectivity will be provided using the Global Broadcast Service and low-earth orbit communications.

- Orbital Mapping Software (C)

Intended to be used to educate commanders to the utility of orbital mapping software for course-of-action planning and space asset capability familiarization. The COTS product has a tailored graphical user interface for the warfighter and is available in a personal computer version. Extensive support libraries for orbital propagation, terrain masking assessment and visibility determination are available.

- Tactical Data Collection and Reporting (C)

Integrates technology into other demonstrations by providing dual-mode in-vehicle and other wireless data communications. The demo provides remote access to vehicles using Internet Standard Protocols. A key feature of the demonstration is a communications device, which can be, used with various communications devices such as Single Channel Ground and Airborne Radio Systems, UHF SATCOM and commercial communications.

- Battlefield Ordnance Awareness (BOA) (C)

Intended to improve situational awareness and battlefield visualization. Using passive sensing technologies, target detection and location will be provided through the characterization and discrimination of enemy weapons systems. Deep attack operations can also be supported by identifying and locating high value targets and conducting BDA.

Communications

- Global Broadcast System (O)

Used to provide high-speed distribution of information from all echelons of command and support to tactically deployed operational units. Direct broadcast systems provide rapid distribution of video, imagery, maps, voice, large database files, and other digital data/products to station-

ary and moving platforms. As part of this demo, a GBS Joint In-Theater Injection (JITI) capability (**Fig. 23-7**) will be used to uplink battlefield data from the theater and broadcast to units without having to send to a CONUS uplink facility.

Fig. 23-7. JITI

- LEO Communications (O)

The LEOCOMM demonstration is designed to acquaint Army commanders with the benefits of improved situational awareness provided by or through space-based communications systems. The LEOCOMM monitors the locations of, and maintains data communications and paging with ground troops during conventional or special operations. (**Fig. 23-8**).

Fig. 23-8. LEOCOMM Data Display

- DirecPC Tactical Exploitation (O)

DirecPC uses a Ku-band transponder on the Galaxy IV satellite and an uplink facility located in Germantown, MD. A mobile network operations center will also be available. The user receive set consists of a ruggedized laptop computer that interfaces to an 18-inch receive antenna.

- SATCOM Planning Information Network (SPIN) (C)

The SPIN will demonstrate automated network and information management capabilities. SPIN will reduce theater CINC staff workload and expertise needed to plan, manage, and control SATCOM resources.

RISTA

- Clark Mobile Ground Station (O)

The Clark Mobile Ground Station will help assess the utility of direct tasking, and downloading of near-real-time satellite imagery.

- Civil/Commercial Imagery Systems (CCIS) (C)

CCIS is intended to assess the tactical utility of direct tasking and direct downlink systems, as well as using HSI to support the warfighter (**Fig. 23-9**).

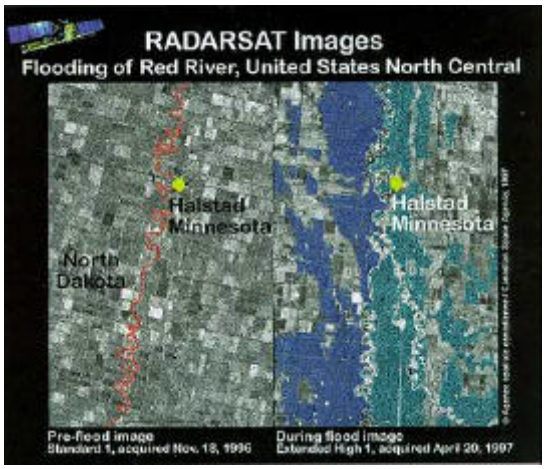

Fig. 23-9. CCIS Use of Radarsat

- Camouflage, Concealment and Deception (CCD) (C)

CCD leverages existing sensor platforms to determine the ability to detect from space the presence or absence of visible and non-visible battlefield obscurants that may affect sensors, weapons, operations, and survivability of friendly forces (**Fig. 23-10**).

Fig. 23-10. CCD Example

Weather, Terrain, and Environmental Monitoring

- Deployable Weather Satellite Workstation (DWSW) (O)

As a tactical terminal, the DWSW will acquire, process and distribute to users real-time high resolution and vertical sounder weather data from polar-orbiting and geostationary satellites. DWSW provides commanders timely and accurate weather data needed to plan military operations (**Fig. 23-11**).

Fig. 23-11. DWSW

- Weather Communications (C)

Weather Communications (**Fig. 23-12**) will demonstrate an integrated communications concept for the rapid transmission and ingestion of weather data and products. Combining with GBS, LEOCOMM and DirecPC will lead to an improved architecture and provide more effective distribution of weather products among forecasters at all echelons.

Fig. 23-12. Weather Communications

- 4D Weather Visualization (C)

4D Weather (**Fig. 23-13**) will integrate near real-time weather data into battlefield visualization in 3D and time. This demonstration will focus on the utility of 3D enhancements to understand and visualize weather dynamics over time. The exploitation of weather data will lead to improved battlespace visualization and situational awareness.

Fig. 23-13. 4D Weather Visualization

- Space Environment Product Integration (C)

The adverse impacts of the space environment on space systems and users can be a major problem for the warfighter. This demonstration will provide for better dissemination of space environment information to planners and staff.

- SWO and Warfighter Education (C)

Through this demonstration, the SMDBL will coordinate, produce and disseminate a space weather education package to enhance exploitation of space-based weather data during military operations.

Warning

- Tactical Automated Situational Receiver (TASR) (O)

The TASR provides digital space-based warning of time sensitive battlefield information to deployed forces using an Apple Newton message pad. Having an imbedded GPS device, the TASR allows for two-way messaging with geodynamic message filtering.

- Wristwatch Warning (C)

Intended to demo the ability to provide accurate and timely warning to a pager (**Fig. 23-14**) sized device.

Fig. 23-14. Commercial Force Warning

Position/Navigation

- GPS Mapping and Navigation (O)

This demonstration fuses position information into a map display (**Fig. 23-15**) using existing GPS capabilities combined with a COTS automobile navigation system to navigate on the battlefield.

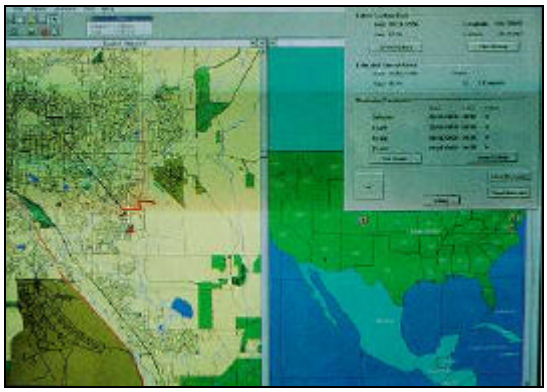

Fig. 23-15. GPS Mapping

- Theater GPS Augmentation (C)

The theater GPS Augmentation System offers a portable and tailorable theater position and navigation capability when the GPS constellation is denied by jamming or negation.

Army Space Support Team (ARSST)

Fundamental requirements such as force projection, space intelligence analysis, communications, and command and control are today dependent upon our capabilities in space. The ARSST is an element of ARSPACE task organized and resourced to support the commanders and staffs of land forces to orchestrate the employment of a complex array of dynamic battlefield resources. An ARSST complements the operational space based capabilities accessed by corps or divisions, such as TENCAP, SATRAN, topographic products, etc, used to obtain a relevant common picture of the battlefield. The team supports the commander and staff in the planning and integration of space assets into their training or military decision making process; obtains, processes and delivers space products to the supported unit (**Fig. 23-16**);

Fig. 23-16. Pos/Nav Training

and assesses the operational impact of friendly and adversary space based capabilities. The ARSST manages these complex tasks from staff planning and the estimate process through contingency or operations execution, assisting the command and staff to integrate and focus space support on mission accomplishment. The team typically supports at the corps, and when resources are available, at the division level. Each team consists of 4-6 officers and NCOs, is equipped with a suite of unique hardware and software, possesses expertise in space applications and operational planning, and remains ready to deploy, when necessary, to the warfighter's location.

Support to the Corps staff and/or Division staff is available at all times, by virtue of the habitual relationship that is maintained between each of the four ARSST and the four US Army corps. Requests for assistance from other organizations will also be met by ARSPACE as on-going missions permit. By employing state-of-the-art sensor and terrain modeling, as well as access to various web sites, ARSST can assist the staff in answering the commander's critical information requirements as well as providing input to assist in the preparation of staff estimates and OPLANS. The teams rely on the supported unit for logistical support.

Satellite Reconnaissance Advance Notice The team can aid staffs in making optimal use of Satellite Reconnaissance Advance Notice (SATRAN) data, which provides information on potential threat satellites and their capabilities to monitor friendly operations.

Position/Navigation The Global Positioning System is an essential combat multiplier, whether in the form of a Precision Lightweight GPS Receiver (PLGR) in the hands of an infantryman (**Fig. 23-17**) or as a component in a weapon system. ARSST obtains and provides data on the fluctuating degree of GPS accuracy at specific locations for a designated time that will be available to friendly forces during planned operations. The team can also provide advice on counter measures to enemy efforts to jam or spoof GPS.

Fig. 23-17. PLGR Use

Space Weather There are a number of phenomena (**Fig. 23-18**) that occur on the surface of the Sun, which can have a dramatic effect on UHF and SATCOM communications, GPS signal reception and radars.

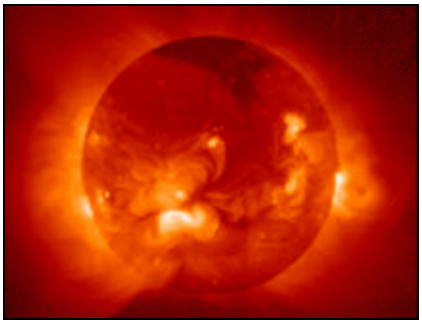

Fig. 23-18. Solar Flare

The ARSST complements the efforts of the Space Weather Officer (SWO) by

obtaining advance forecasts of these events and assessing which friendly systems will be degraded, the degree of degradation and when.

Imagery The ARSST deploys with a state-of-the-art automated data processing package to provide commanders and staffs imagery products beyond those provided by internal topographic units (**Fig. 23-19**). These products include video taped fly-throughs, 3-D images, perspective views and image maps, all in various levels of resolution. Image maps provide staffs and soldiers up-to-date maps of areas where no maps exist or are out of date.

Fig. 23-19. Imagery Support

Intelligence Support Space intelligence analysis is provided to the ARSST by ARSPACE Intelligence staff members. Their focus is to conduct Space Intelligence Preparation of the Battlefield, respond to space related RFI, provide assessments of how the enemy will use it's space systems, and to provide expertise on friendly force space-based intelligence capabilities. The Intel staff has a SIPRNET home page with detailed listings of threat space capabilities. Finally, the intelligence element assists the supported staff's planning effort by providing expertise on enemy and friendly capability to employ commercial satellites, enemy/friendly space vulnerabilities, and recommendations to support the targeting process.

SATCOM The team provides a limited supplement to the unit's early entry communications connectivity using non-secure Iridium handsets (**Fig. 23-20**), and International Maritime Satellite (INMARSAT) hand-carried terminals providing secure fax, data, telex, and voice.

Fig. 23-20. Iridium Use

Multispectral Imagery Production Facility Provides responsive support to the ARSST and other DOD organizations requesting remote sensing products. The facility contains state of the art computing systems that can import, manipulate, analyze, and produce various imagery products for the warfighter (**Fig. 23-21**).

Fig. 23-21. Kuwait City MSI Map

The facility maintains a 600 scene imagery archive as well as worldwide Arch Digitized Raster Graphics (ADRG) cov-

erage. Short-term storage capacity of the lab is 3/4-terabit. Data not in the archive is routinely obtained from multiple DOD and commercial sources. Digital imagery processing capabilities include radar, multispectral and hyperspectral; digital elevation data editing and creation, and integrated geographic information systems processing. Output is in the form of tape, CD-ROM, SIPRNET, and hard copy.

The Army Perspective

Providing an Army perspective and identifying requirements to USCINCSPACE has been a principle ARSPACE activity since the command was created as the Army Space Agency in 1984. This role, as the Army's representative to the CINC, is based on the premise that the growing technical requirements for the Army's use of space are best articulated by an organization with direct knowledge of Army operations. Not only does ARSPACE (FWD) act as a facilitator for internal service requirements for space, it also serves to ensure that CINCSPACE is aware of changing Army requirements, doctrine and capabilities. This unique relationship between an operational mission and a joint requirements interface assures ARSPACE will continue to sharpen the support available to both Joint and service-specific missions.

The CINC support mission also places ARSPACE (FWD) personnel in daily contact with the CINC's staff to participate in Joint studies, formulate the CINC's Integrated Priority Lists (IPL) and join the CINC's Joint outreach teams.

ARSPACE also participates with the Air Force Space Command (AFSPACE) in Satellite Operations (including the Defense Satellite Communications System). In this regard, ARSPACE (FWD) provides personnel who control and receive requests from Army users for communications support. ARSPACE then assists in the prioritization of ground receivers to support specific operations and provides Ground Mobile Force (GMF) communication systems through a standing MILSATCOM battalion with deployable company-sized units.

Army personnel work directly with AFSPACECOM personnel at Schriever AFB in controlling NAVSTAR GPS satellites. These soldiers are integrated into teams of operational Air Force personnel from the 21st Space Wing at Peterson AFB. ARSPACE has dedicated soldiers to this mission since 1989.

ARSPACE (FWD) also focuses Army funding and provides performance monitoring of the SMDC Deep Space Surveillance Operations located in the Western Test Range, Kwajalein Atoll. In this role, operating funds are channeled through ARSPACE to Kwajalein to support space surveillance missions. ARSPACE also serves to evaluate the number of orbital and pre-orbital vehicles passing within range of several sensing systems. "Kwaj" is frequently the first US station (**Fig. 23-22**) to detect new space-bound vehicles from several key Asian and Eurasian launch facilities.

Fig. 23-22. US tracking station at Kwajalein

ARMY SPACE AND MISSILE DEFENSE COMMAND (SMDC)

The major functions of the Army Space and Missile Defense Command, headquartered at Huntsville, Alabama include:

- Conducting R&D related to space and theater missiles through the activities of the Missile Defense and Space Technologies Center;

- Executing the Army Space Test and Evaluation Program under the Missile Defense Battlefield Integration Center;
- Operating the Army's High Energy Laser Space Test Facility at White Sands Missile Range to provide a means of evaluating equipment and concepts relating to weapons and weapons effects; and
- Providing space surveillance and space object identification services from Kwajalein Atoll.

ARMY SPACE PROGRAM OFFICE (ASPO)

ASPO is the oldest of the Army organizations dedicated to space support. ASPO is the Army's access and coordination point for classified space assets. It's also the oldest service office dedicated to Tactical Exploitation of National Capabilities (TENCAP), a program to leverage national intelligence systems in support of the tactical warfighter.

ASPO has established a reputation as an organization that fields extremely useful, low density systems that allow tactical users to tap into national, theater and Army intelligence information.

ASPO works directly as a field operating agency under the Army's SMDC. ASPO supports the Army to equip and train the force with a small number of equipment suites per year. Requirements for ASPO systems are established through the TRADOC Intelligence Center and school at Ft. Huachuca. ASPO also maintains direct liaison with a large number of field users and has historically been very responsive to requirements established through both TRADOC and non-TRADOC mechanisms.

U.S. Army TENCAP Systems

The following brief descriptions demonstrate the Army's success in fielding TENCAP systems. Note that not all ASPO systems are depicted.

Advanced Electronic Processing and Dissemination System (AEPDS) is a receive, exploitation and dissemination system for Signals Intelligence (SIGINT). It combines all of the functionality found in the earlier generation of the Electronic Processing and Dissemination System (EPDS) with the Enhanced Tactical User's Terminal (ETUT). The AEPDS will be fielded to the Corps organic Military Intelligence (MI) Brigade and the Echelon Above Corps (EAC) MI Brigade.

Modernized Imagery Exploitation System (MIES) is a receive, exploitation and dissemination system for imagery. The MIES is fielded to the Corps organic MI Brigade and to the EAC MI Brigade. MIES is capable of archiving, exploiting, managing exploitation and disseminating (via secondary imagery dissemination or "SID") imagery and imagery products. The system boasts a six-hour set-up or teardown time and is capable of operating over semi-improved roads. MIES can be driven on/off a C-5 or C-17 aircraft for rapid deployment, but must be palletized for C-130 or C-141 transport. The system is TEMPEST shielded to permit operations as a stand-alone enclave at the highest classification levels. Output products are typically intelligence reports, annotated soft-copy imagery and/or hard-copy prints (the later two forms as SID products).

Enhanced Tactical Radar Correlator (ETRAC) is a system capable of receiving raw, phased-array radar data from the Advanced Synthetic Aperture Radar System-2 (ASARS-2) sensor. Like the MIES, the ETRAC is fielded to the Corps MI Brigade and the EAC MI Brigade. The ETRAC is generally collocated with the MIES when tactically deployed, but can be employed in a stand-alone mode for limited periods of time. The system is also capable of receiving data from UAVs, the APG-73 Joint Services Imagery Processing System (JSIPS), Guardrail and the Joint Surveillance Target Attack Radar System/Ground support Module (JSTARS/GSM). ETRAC is

C-130 drive-on or off capable, making it an easily deployed capability for all-weather, day or night support. Products available from ETRAC include intelligence reports, annotated National Imagery Transmission Format (NITF) SID imagery, hardcopy prints and/or targeting reports. Functions supported by ETRAC include mission planning, targeting and intelligence reporting. Setup of the ETRAC is minimal and the system is designed to be self-sustaining for up to fourteen days.

Enhanced Tactical User Terminal Retrofit (ETUT) is a C-130 deployed general-purpose intelligence system designed for employment at Corps level.

Mobile Integrated Tactical Terminal (MITT) is a Division level system designed to provide intelligence support on an extremely mobile platform.

Forward Area Support Terminal (FAST) is transported in ruggedized cases for support wherever a user requires a lightweight, but very capable intelligence capability. Its ability to be transported by organic tactical vehicles makes this an extremely flexible system.

Tri-band SATCOM Sub-system (TSS) provides C, X and Ku band communications in a tactical shelter with an aggregate transmission rate of 6.2 Mbps (256 kbps/channel) using Commercial Off-The-Shelf (COTS) technologies. The TSS can provide voice and data linkage between tactical users and communications satellite systems anywhere in the world (**Fig. 23-23**).

Chariot (also known as the Receive Only Terminal (ROTERM)) is a very small intelligence-oriented capability (a laptop computer and radio with collapsing antenna) to receive voice or data communications. Its small size, absence of electronic signature (receive only) and ability to communicate with a wide variety of satellites make it ideal for many intelligence operations, particularly those associated with Special Forces and/or Ranger missions.

SUCCESS Radio is a key component of the Army TENCAP systems which provide data communications for a wide variety of intelligence broadcast services. The SUCCESS radio has supported many military operations.

Fig. 23-23. Tactical Comm Setup

Secondary Imagery Dissemination Environment and Resource Manager (SIDEARM) is an imagery request and display tool capable of running on laptop computers and providing deployed or remote imagery users with a means of requesting, receiving and exploiting imagery products.

For additional information on the latest technologies and systems ASPO is involved with under the TENCAP Program, contact the ASPO in Alexandria, Virginia.

ASPO Summary

ASPO has been successful in providing a wide range of very useful applications to allow tactical users to gain the advantages of space capabilities. ASPO's ability to understand the needs of the tactical users and willingness to support them has greatly strengthened the Army as a user of space exploitation tools. ASPO continues to champion the fielding of the next generation of systems and technologies to leverage space capabilities. These efforts are represented by ASPO's development of the Tactical Exploitation System (TES).

The TES is an evolutionary system combining all functions of the AEPDS, MIES and ETRAC into a single integrated, downsized, scaleable system. It will serve as a pre-processor for the All-Source Analysis System, the Common Ground Station and the Digital Topographic Support System. TES is also capable of supporting early entry and split-based operations. TES will support the Ground Component Commander by allowing direct, timely access to the intelligence that supports deep battle operations.

CONCLUSIONS

The Army's dedication to maintaining a tactically relevant presence in the space community was demonstrated by General Gordon R. Sullivan (Retired), then Chief of Staff of the Army, when he stated:

"Aggressive exploitation of space capabilities and products normalized in concepts, doctrine, training, operations, and modernization will ensure that the Army is able to maintain land force domination well into the 21st century. The Army's future is inextricably tied to

Success on the future battlefield requires exploitation of the Army's five doctrinal tenets:

- *initiative,*
- *agility,*
- *depth,*
- *synchronization,*
- *and versatility.*

The extension of that battlefield into space provides commanders with an enhanced capability to exploit and advance these tenets across all Army operations. Combining near-continuous, global coverage, real-time and near-real-time capabilities for communications, positioning/navigation, surveillance, environmental monitoring, warning and target acquisition allows commanders to anticipate enemy actions; strike at vulnerable points faster than the enemy can react; and win the land battle. Likewise, these same capabilities allow the commanders to have success in operations other than war.

As the Army moves into the 21st century, it's imperative that it remains involved in space and fully exploit space capabilities. The Army will continue to define its role, identify requirements and plan strategies for involvement. It will also participate more in the joint, combined, civil and commercial environments to optimize its use of this "fourth medium of warfare."

TOC

REFERENCES

"Army Space Command Mission" (http://www.spacecom.af.mil/)

"FY98 Army Space Exploitation Demonstration Program" booklet.

FM 100-18, "Space Doctrine, Education and Functional Area"

Information Sheet, *"US Army Space Command Space-Based Combat/ Force Multiplier Capabilities for the Warfighter"*, June 1999.

http://www.smdc.army.mil